

# TEST METHODS AND SPECIFICATIONS

There are two basic test methods utilized in hurricane testing; HVHZ TAS 201, 202, and 203 (Florida Building Code) and ASTM E 1886. These documents describe the technique used to propel the airborne missile and impact the fenestration system. These test methods also include details for subjecting the test specimens to the required repetitive cyclical loads (see Table 3 below).

The referenced ASTM test method also has a corresponding specification, ASTM E 1996, that indicates what missile size and weight shall be used depending upon application and wind speed (see table 1 and 2), location of impact, pass/fail criteria, and substitution limitations. For example, 30 feet from grade and below is typically the zone for impact by a wood 2 x 4 (large missile), whereas above 30 feet from grade is the zone for impact by 2 gram steel ball bearings (small missile).

**Table 1 - Missile Type & Velocity**

Missile Level	Missile Description	Impact Speed	
		ft/sec	mph
A	Steel ball, Weight: 2g ± 5%	130	89
B	2x4 lumber, Weight: 2.0 lb. ± 0.25 lb. Length: 1 ft - 9 in. ± 4 in.	50	34
C	2x4 lumber, Weight: 4.5 lb. ± 0.25 lb. Length: 4 ft - 4 in. ± 4 in.	40	27
D	2x4 lumber, Weight: 9.0 lb. ± 0.25 lb. Length: 8 ft. ± 4 in.	50	34
E	2x4 lumber, Weight: 2.0 lb. ± 0.25 lb. Length: 1 ft - 9 in. ± 4 in.	80	55

**Table 3 - Cycle Test Load Requirements**

Seq	Applied Load Direction	Load Range (% of Rated Design Pressure)		# of Cycles
		Low Limit	High Limit	
1	Positive	20%	50%	3,500
2	Positive	0%	60%	300
3	Positive	50%	80%	600
4	Positive	30%	100%	100
5	Negative	30%	100%	50
6	Negative	50%	80%	1,050
7	Negative	0%	50%	50
8	Negative	20%	50%	3,350

**Table 2 - Missile Req'd by Elevation & Wind Zone**

Wind Zone	Wind Speed mph (km/hr)	HVHZ Missile Level ≤ 30 ft (9m)	ASTM Basic Missile Level ≤ 30 ft (9m)	ASTM & FBC Small Missile Level > 30 ft (9m)
1	110 (177)	D	C (B for Skylights)	A
2	120 (193)	D	C	A
3	130 (209)	D	D	A
4	140 (225)	D	D	A

